Management of Tooth with Necrotic Pulps and Open Apex : Case Report

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Abstract: – A necrotic immature maxillary first premolar in an 8 year-old patient was treated. Instead of the standard root canal treatment protocol and apexification,, the antimicrobial agents were used in the canal. After the disinfection protocol is complete, the apex is mechanically irritated to initiate bleeding into the canal to produce a blood clot. The double seal of the coronal access is then made. Radiographic examination showed the start of increase the root length and width at six months. Thickening of the canal wall and complete apical closure was confirmed at two years after the treatment, indicating the antimicrobial protocol and the effective coronal seal appears to have produced the environment necessary for successful revascularization potential of a young permanent tooth pulp into a bacteria-free root canal space.
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1. Introduction

When the pulp of a tooth is irreversibly inflamed or necrotic and the apex is open, conventional root canal treatment is difficult to perform and the outcome is uncertain. . Pulp necrosis of an immature tooth as a result of caries or trauma could arrest further development of the root, leaving the tooth with thin root canal walls and blunderbuss apices[(1)].

Traditionally, the apexification procedure has consisted of multiple and long-term applications of calcium hydroxide [Ca (OH)2] to create an apical barrier to aid the obturation. Recently, artificial apical barriers such as those made with mineral trioxide aggregate (MTA) have been used in teeth with necrotic pulps and open apices. More recently, procedures referred to as regenerative endodontic have received much attention as an option for these teeth.

MTA is a powder aggregate, containing mineral oxides, it has good biological action [(2)] and stimulates repair[(3)] because it allow cellular adhesion, growth and proliferation on its surface[(4)].The ideal outcome for a tooth with an immature root and a necrotic pulp would be the regeneration in the canal of pulp tissue capable of promoting the continuation of normal root development. Many studies show a favorable long-term prognosis with an overall success rate of 88.8% [(5)].

The study done by Jeruphan et al 2012 .they show the revascularization was associated with significantly greater increase in root length and width in comparison of calcium hydroxide apexification and MTA apexification as well as excellent survival rate.

This present study has demonstrated that revascularization of the pulp of immature permanent teeth is a clinical possibility; a treated tooth might even respond normally to cold test after about a year. This treatment modality should be preferable to the traditional apexification treatment.

The purpose of this article is to report, as well as discusses the successful prognosis of the revascularization protocol for maxillary premolars with necrotic and open apex.

Case report

The patient was an 8 year-old female. She had a history of pain of the right maxillary premolar for which she received careis excavation and pulpectomy of tooth # 14 in the primary health care (Fig. 1).. Then referred to the king fahad hospital for consultation and complete the root canal treatment.

Figure.1 (radiograph was taken at PHC)

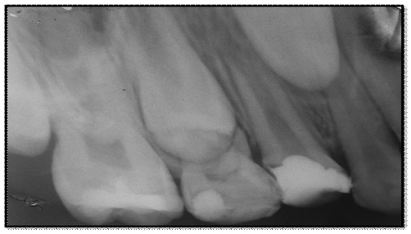

Figure 2. preoperative radiograph

The preoperative radiograph revealed interrupted lamina Dura with widened PDL space around the tooth # 14 with open apex and wide pulp canal (Figure 2). The periodontal probing was within normal limits for all teeth in the upper right region. Diagnostic testing was not applicable on cold and electric pulp testing and it was not tender on percussion and palpation. The pulp was diagnosed as previously initiated with normal apical tissues.

The revascularization procedure

Patient presented in the clinic for treatment with no contraindication. After discus the treatment plans with parents and patient. Informed Consent was granted prior to treatment. As part of informed consent, patients and legal guardians should be informed that 2 or more appointments may be necessary for the regenerative procedure initial PA radiograph was taken. Under Topical anesthesia apply to the area then1 carpule of 2% lidocaine with 1:100000 epinephrine were administered via buccal and palatal infiltration. Rupper Dam (RD) was placed. Temporary filling was removed and build up of the crown with glass ionomer restoration (figure3.a) .tooth #14 was accessed and irrigate with 5.25% NaOCL by The use of needles with closed ends and side vents. canal dried with paper points and apply Ca(OH)2((Vitapex, Neo Dental Chemical Products, Tokyo, Japan) as intracanal medication. Cotton pellet was placed and tooth was restored with GI restoration (figure 3 b)

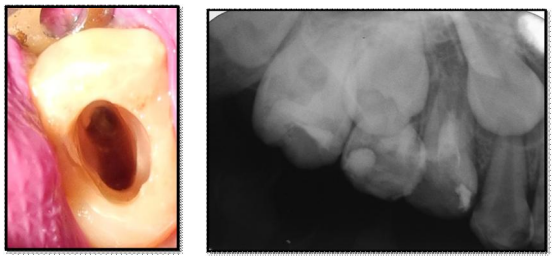

Figure 3. a: build up of the crown with glass ionomer restoration . b: Ca(OH)2 as intra canal medication

In the Second appointment, patient presented to the clinic assess response to initial treatment. Pt was not complained and asymptomatic. 1 carpule of 2% lidocaine without epinephrine administered. Rupper dam (RD) was placed. Temporary filling was removed. Sterilized Hand file introduced into the canal to create bleeding in the canal system by over instrumentation. (Figure 4a) Apply MTA (ProRoot MTA; Dentsply Maillefer) on the coronal segment of the root (Figure 4b) and temporization with Glass ionomer restoration (figure 5.a,b).

Figure 4.a, Figure 4.b

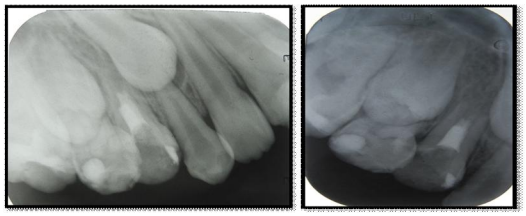

Figure 5.a,b.

In the third appointment, patient presented to the clinic. Removed the temporary filling restored with composite build up (figure 6). Patient was referred to Pedodontic clinic to construct SSC crown.

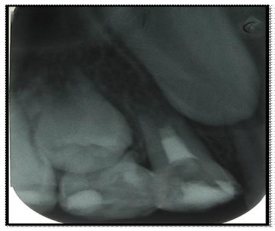

Figure 6.

POST- OPERATIVE EVALUATIONS:

After one month, patient presented to the clinic and take PA radiograph which appeared no changed. Upon clinical examination, Patient was asymptomatic and no pain or swelling (figure 7).

After three months, patient presented to the clinic and take PA radiograph which revel little change in the root. Upon clinical examination, pt was asymptomatic and no pain or swelling (figure8)

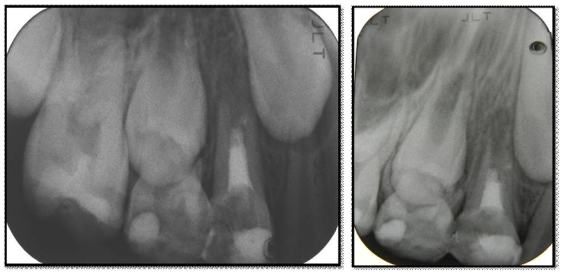

Figure7.one month up Figure 8.three months follow up

After six months pt presents to the clinic and take PA radiograph which revel more change in the

root shape. Upon clinical examination, pt had delay response with cold test (figure 9.a, b)


Figure 9.a


Figure 9.b

After one year, patient presented to the clinic and take PA radiograph which revel marked change in the root shape width and length. Upon clinical examination, patient had d response with cold test. No pain or swelling and patient asymptomatic. Tooth was cover with SSC (figure 10: a,b,c).


Figure 10.a: mesial shift


b: straight view


Figure 10.c: st st crown was constructed.

After 18 months patient presented to the clinic and take PA radiograph which revel marked increased in the root length and width and apex was closed. . Upon clinical examination, patient had response with cold test (figure 11)


Figure 11.

After 2 years, patient presented to the clinic and take PA radiograph which revel marked increased in the root length and width and apex was closed (figure12.a,b). By using the image J program there is increase 4% in the root length and 27% in the root width. Upon clinical examination, pt had response with cold test. No pain or swelling and patient asymptomatic (figure13: a,b)


Figure 12.a


Figure12.b

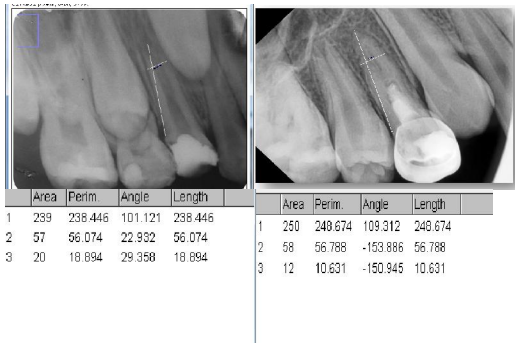

Figure 13.a,b: By using the image J program there is increase 4% in the root length and 27% in the root width.

2. Discussions

Treatment of the young permanent tooth with a necrotic root canal system and an incompletely developed root is fraught with difficulty. More recently, procedures referred to as regenerative endodontics have received much attention as an option for these teeth

The ideal outcome for a tooth with immature root and a necrotic pulp would be the regeneration in the canal of pulp tissue capable of promoting the continuation of normal root development. The key factor for the success of this process is disinfection of the root canal system, because tissue growth will halt at the level where bacteria are found [6]

The most effective disinfection of the infected root canal is in general attained by the mechanical de-bridement and chemical irrigation of the canal with the addition of an intracanal dressing. It is extremely important to ensure that the irrigating needle is loose in the canal and that the NaOCl irrigation is performed very slowly. In cases reported to date, the careful application of NaOCl does not produce postoperative sequelae [7].

In the case presented here, after copious irrigation with sodium hypochlorite, we used a calcium hydroxide past. They showed excellent

disinfection. The calcium hydroxide paste used in Endodontics is composed of a powder, a vehicle, and an optional radiopacifier .Various biological properties and effects such as antimicrobial activity, tissue-dissolving ability, inhibition of tooth resorption, and induction of repair by hard tissue formation have been attributed to this strong alkaline sub-stance, which has a pH of approximately 12.5. Its clinical applications have been well documented in the scientific literature, including its use as an anti-microbial agent, controlling exudates from root canals, arresting inflammatory root resorption, inducing calcific response, and also as a root canal sealer [8-9-10].

All cases of unfavorable revascularization outcome apparently were related to a failure to induce any bleeding into the canal. The absence of a blood clot has been shown to have a negative impact on successful revascularization of the pulp in an animal study. A possible reason might be the resolution of inflammatory reaction after dressing with the antibiotic mixture, making it more difficult to induce bleeding. Another reason might be related to the use of local anesthesia containing epinephrine that results in vasoconstrictor. Platelet-rich plasma (PRP) is rich in growth factors, and erythrocytes that would undergo necrosis shortly after clot formation[11]. Finally, the coronal seal consisted of a glass ionomer base followed by a bonded resin material, which apparently provided a bacteria-tight seal [12]
preclinical studies that deliver specific growth factors, scaffolds, and stem cells into the root canal space have demonstrated the histological regeneration of pulp tissues that fulfill nearly all the criteria for a pulp-dentin complex, including production of cells with an odontoblast-like phenotype [13-14-15]

A type of mesenchymal stem cell-like cells residing in human dental pulp was reported in a series of papers by Shi and colleagues (2000-2003). These cells were named postnatal dental pulp stem cells (DPSCs) and exhibited the ability to form pieces of ectopic human pulp/dentin-like complex as well as to form scattered dentin-like structures on existing human dentin surface [16-17].

3. Conclusions

This present study has demonstrated that revascularization of the pulp of immature permanent teeth is a clinical possibility, a treated tooth might even respond normally to cold test after about a year. This treatment modality should be preferable to the traditional apexification treatment.

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